1.(Cancelled) A compound semiconductor structure comprising:

a GaAs-based supporting semiconductor structure;

a first layer of gallium oxide located on a surface of the supporting semiconductor structure to form an interface therewith; and

a second layer of a Ga-Gd oxide disposed on the first layer.

2.(Cancelled) The compound semiconductor structure of claim 1 wherein the Ga-Gd oxide is $Gd_3Ga_5O_{12}$.

3.(Cancelled) The compound semiconductor structure of claim 1 wherein the GaAs-based supporting semiconductor structure is a GaAs-based heterostructure.

4.(Cancelled) The compound semiconductor structure of claim 3 wherein the GaAs-based supporting semiconductor structure is an at least partially completed metal-oxide field effect transistor.

5.(Cancelled) The compound semiconductor structure of claim 3 wherein the GaAs-based supporting semiconductor structure is an at least partially completed heterojunction bipolar transistor.

6.(Cancelled) The compound semiconductor structure of claim 3 wherein the GaAs-based supporting semiconductor structure is an at least partially completed semiconductor laser.

7.(Cancelled) The compound semiconductor structure of claim 1 wherein the first layer of gallium-oxide has a thickness in a range of approximately .5 nm to 10 nm.

8.(Cancelled) The compound semiconductor structure of claim 1 wherein the second layer of Ga-Gd oxide has a thickness in

a range of approximately 5 nm to 20 nm.

9.(Cancelled) A method of forming a dielectric layer structure on a supporting semiconductor structure comprising the steps of:

providing a GaAs-based supporting semiconductor structure;

depositing a first layer of gallium oxide on a surface of the supporting structure; and

depositing a second layer of a Ga-Gd-oxide on the first layer.

10.(Cancelled) The method of claim 9 wherein the step of depositing the layer of gallium oxide includes depositing the layer of gallium oxide by evaporation.

11.(Original) The method of claim 10 wherein the step of depositing a layer of gallium oxide on the surface of the supporting semiconductor structure by evaporation includes one of thermal evaporation, electron beam evaporation, and laser ablation.

12.(Currently Amended) The method of claim ~~11~~ 25 further comprising the step of evaporating atomic oxygen during at least a portion of the step of depositing the layer of gallium oxide.

13.(Currently Amended) The method of claim 12 wherein ~~the step of~~ evaporating atomic oxygen begins after at least one monolayer of gallium oxide has been deposited onto the surface of the ~~supporting~~ semiconductor structure.

14. (Cancelled) The method of claim 10 wherein the step of depositing the second layer includes the step of evaporating Gd.

15. (Cancelled) The method of claim 13 wherein the step of depositing the second layer includes the step of evaporating Gd.

16. (Currently Amended) The method of claim ~~15~~ 13 wherein ~~the step of~~ evaporating atomic oxygen commences before ~~the step of~~ evaporating the Gd source material.

17. (Currently Amended) The method of claim ~~15~~ 13 wherein ~~the step of~~ evaporating the Gd source material commences before ~~the step of~~ evaporating atomic oxygen.

18. (Amended) The method of claim ~~9~~ 25 wherein the Ga-Gd oxide is $Gd_3Ga_5O_{12}$.

19. (Amended) The method of claim ~~9~~ 25 wherein the GaAs-based ~~supporting~~ semiconductor structure is a GaAs-based heterostructure.

20. (Amended) The method of claim 19 wherein the GaAs-based ~~supporting~~ semiconductor structure is an at least partially completed metal-oxide field effect transistor.

21. (Amended) The method of claim 19 wherein the GaAs-based ~~supporting~~ semiconductor structure is an at least partially completed heterojunction bipolar transistor.

22. (Amended) The method of claim 19 wherein the GaAs-based ~~supporting~~ semiconductor structure is an at least partially completed semiconductor laser.

23.(Amended) The method of claim ~~9~~ 25 wherein the first layer of gallium oxide has a thickness in a range of approximately 0.5 nm to 10 nm.

24.(Amended) The method of claim ~~9~~ 25 wherein the second layer of Ga-Gd oxide has a thickness in a range of approximately 5 nm to 20 nm.

25.(Previously Submitted) A method of forming a dielectric layer structure on a semiconductor structure comprising the steps of:

providing a GaAs-based semiconductor structure;

depositing a first layer of gallium oxide on a surface of the structure through evaporation of a first source; and

depositing a second layer of a Ga-Gd-oxide on the first layer through evaporation of a second source distinct from said first source, wherein the first source is crystalline Ga_2O_3 and the second source is a Gd source material, wherein ~~the crystalline Ga_2O_3 is evaporated using a first high~~ temperature effusion cell, and wherein the Gd source material is evaporated using a second high temperature effusion cell distinct from said first effusion cell.

26.(Cancelled) The method of claim 25, wherein the first source is crystalline Ga_2O_3 and wherein the second source is Ga-Gd-oxide.

27.(Cancelled) The method of claim 26, wherein the crystalline Ga_2O_3 is evaporated using a first high temperature effusion cell, and wherein the Ga-Gd-oxide is evaporated using a second high temperature effusion cell distinct from said first effusion cell.

28. (Previously Presented) The method of claim 25, further comprising the step of depositing atomic oxygen during deposition of the first layer of gallium oxide.

29. (Previously Presented) The method of claim 28, wherein deposition of atomic oxygen is commenced immediately after formation of a monolayer of gallium oxide on a surface of the structure.

30. (Currently Amended) A method of forming a dielectric layer structure on a semiconductor surface, comprising the steps of:

providing an apparatus comprising a first high temperature effusion cell containing Ga_2O_3 and a second high temperature effusion cell containing ~~Ga-Gd-oxide~~ a Gd source material;

evaporating Ga_2O_3 from the first cell onto a GaAs substrate, thereby forming a first dielectric layer on the substrate; and

evaporating ~~Ga-Gd-oxide~~ the Gd source material from the second cell onto the first dielectric layer, thereby forming a second dielectric layer comprising Ga-Gd-oxide.

31. (Previously Presented) The method of claim 30, further comprising the step of depositing atomic oxygen over the substrate concurrent with the formation of the first dielectric layer.

32. (Previously Presented) The method of claim 30, further comprising the step of depositing atomic oxygen over the substrate immediately after formation of a monolayer of gallium oxide on a surface of the structure.